



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/665,151	09/22/2003	Vishnu K. Agarwal	M4065.0195/P195-B	5782
24998 7590 02/05/2007 DICKSTEIN SHAPIRO LLP 1825 EYE STREET NW Washington, DC 20006-5403			EXAMINER PHAM, HOAI V	
			ART UNIT 2814	PAPER NUMBER
SHORTENED STATUTORY PERIOD OF RESPONSE		MAIL DATE	DELIVERY MODE	
3 MONTHS		02/05/2007	PAPER	

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

<b>Office Action Summary</b>	Application No. 10/665,151	Applicant(s) AGARWAL ET AL.	
	Examiner Hoai v. Pham	Art Unit 2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 13 November 2006.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-3,5,6,8-11,23,28,39,44,77-81,84 and 85 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 9-11,39,44 and 77 is/are allowed.
- 6) ☒ Claim(s) 1-3,5,6,8,23,28,78-81,84 and 85 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-3, 5, 6, 8, 23, 28, 78, 81 and 84-85 are rejected under 35 U.S.C. 102(e) as being anticipated by Hieke [U.S. Pat. 6,188,095] previously applied.

With respect to claim 1, Hieke (figs. 3-4, cols. 1-3) discloses a monolithic semiconductor device comprising:

a semiconductor substrate (silicon wafer) (col. 2, lines 53-60);

a plurality of microstructure stud capacitors (7) formed over the substrate (col. 2, lines 24-26); and

a brace (8, 9) transversely extending between lateral sides of at least two of the microstructure stud capacitors (7); and

a vertical space between said brace and said semiconductor substrate.

With respect to claim 2, Hieke discloses that the brace (8, 9) interconnects substantially all of the stud capacitors (7) (see fig. 4).

With respect to claim 3, Hieke discloses that the brace (8, 9) is located substantially near upper ends of the stud capacitors (7) (see fig. 4).

With respect to claim 5, Hieke discloses that the brace (8, 9) comprises a microbridge structure extending above the substrate and between two or more of the stud capacitors (7) (see fig. 4).

With respect to claim 6, Hieke discloses that the stud capacitors (7) each comprise a conductor material portion standing upright over the substrate, and wherein the brace (8, 9) interconnects the conductor material portion of two or more of the stud capacitors (7) (see fig. 4).

With respect to claim 8, Hieke discloses that the stud capacitors (7) each comprise generally solid cylindrical shapes and the brace comprises a microbridge structure (fig. 4).

With respect to claim 23, Hieke (figs. 3-4, cols. 1-3) discloses a semiconductor storage capacitor comprising:

a semiconductor substrate (silicon wafer) (col. 2, lines 53-60);

a plurality of capacitor storage node microstructures (7) formed over the substrate; and

Art Unit: 2814

a brace (8, 9) transversely extending between lateral sides of at least two of the microstructures (7) for supporting the at least two of the microstructures, wherein the microstructures comprise generally solid cylindrical shapes and the brace comprises a microbridge structure, and wherein there is a vertical space between said brace and said semiconductor substrate.

With respect to claim 28, Hieke (figs. 3-4, cols. 1-3) discloses a semiconductor storage capacitor comprising:

a semiconductor substrate (silicon wafer) (col. 2, lines 53-60);

capacitor storage node microstructures (7) formed over the substrate; and

a brace (8, 9) transversely extending between lateral sides of at least two of the microstructures for supporting the at least two of the microstructures, wherein the microstructures comprise stud capacitors, and wherein there is a vertical space between said brace and said semiconductor substrate.

With respect to claim 78, Hieke (figs. 3-4, cols. 1-3) discloses a support structure on a semiconductor device comprising:

a plurality of braces (8, 9) transversely extending between lateral sides of microstructure (7) formed over a semiconductor substrate (silicon wafer) for supporting the at least two of the microstructures (col. 2, lines 53-60), said microstructure (7) comprising a generally solid cylindrical shape, wherein said plurality of braces (8, 9)

Art Unit: 2814

comprise a support structure for said microstructure (7); and a vertical space between the plurality of braces (8, 9) and the semiconductor substrate.

With respect to claim 81, Hieke (figs. 3-4, cols. 1-3) discloses a semiconductor support structure, comprising:

- a semiconductor substrate (silicon wafer) (col. 2, lines 53-60);
- a plurality of microstructures (7) formed over the substrate ; and
- a plurality of braces (8, 9) transversely extending between lateral sides of at least two of said plurality of microstructures (7) for supporting the at least two of the microstructures, wherein said plurality of brace (8, 9) comprises a lattice support structure wherein said plurality of brace (8, 9) intersect at said microstructures (7), and wherein there is a vertical space between the support structure and the semiconductor substrate.

With respect to claim 84, Hieke (figs. 3-4, cols. 1-3) discloses a semiconductor storage capacitor comprising:

- a semiconductor substrate (silicon wafer) (col. 2, lines 53-60);
- a plurality of capacitor storage node microstructures (7) formed over the substrate, said microstructures (7) having vertical surfaces;
- a brace (8, 9) transversely extending between the vertical surfaces of at least two of the microstructures (7) for supporting the at least two of the microstructures, said

Art Unit: 2814

brace being located substantially near the upper ends of said vertical surfaces of said microstructures; and

a vertical space between said brace and said substrate.

With respect to claim 85, Hieke (figs. 3-4, cols. 1-3) discloses semiconductor storage capacitor, comprising:

a semiconductor substrate (silicon wafer) (col. 2, lines 53-60);

capacitor storage node microstructures (7) formed over the substrate, said microstructures having vertical surfaces; and

a plurality of braces (8, 9) transversely extending between the vertical surfaces of at least two of the microstructures for supporting the at least two of the microstructures, said plurality of braces being located substantially near the upper ends of said vertical surfaces of said microstructures (7), and wherein there is a vertical space between said plurality of braces and said semiconductor substrate.

3. Claims 78 is rejected under 35 U.S.C. 102(e) as being anticipated by Hirose [U.S. Pat. 6,097,097] previously applied.

Hirose (fig. 1A, col. 4) discloses a support structure on a semiconductor device comprising:

a plurality of braces (1) transversely extending between lateral sides of microstructure (3) formed over a semiconductor substrate (2) for supporting the at least two of the microstructures, said microstructure (3) comprising a generally solid

Art Unit: 2814

cylindrical shape, wherein said plurality of braces (1) comprise a support structure for said microstructure (3); and a vertical space (10) between the plurality of braces (1) and the semiconductor substrate.

4. Claims 79 and 80 are rejected under 35 U.S.C. 102(e) as being anticipated by Al-Shareef et al. [U.S. Pat. 6,351,005] previously applied.

With respect to claim 79, Al-Shareef et al. (fig. 8a, cols. 4-10) discloses a brace for a semiconductor device comprising:

at least one brace (20) transversely extending between lateral sides of at least two microstructures (30) on a semiconductor substrate (10), said at least two microstructures (30) comprising stud capacitors, wherein said at least two microstructures (30) are supported only by said at least one brace (20), wherein said at least one brace comprises one material layer.

With respect to claim 80, Al-Shareef et al. (fig. 8a, cols. 4-10) discloses an in-process semiconductor device comprising:

a semiconductor substrate (10);

at least two microstructures (30) formed over the substrate (10), said at least two microstructures (30) comprising generally solid cylindrical shapes; and

at least one brace (20) transversely extending between lateral sides of at least two microstructures (30), wherein said at least two microstructures (30) are supported



Art Unit: 2814

only by said at least one brace (20), and wherein said at least one brace comprises a single material layer.

***Allowable Subject Matter***

5. Claims 9-11, 39, 44, and 77 are allowed.

***Response to Arguments***

6. Applicant's arguments filed 11/13/2006 have been fully considered but they are not persuasive.

- Applicant argues that Heike fails to teach or suggest a "brace transversely extending between lateral sides of at least two of the microstructure stud capacitors for supporting the at least two stud capacitors".

Applicant's argument is not persuasive because Hieke clearly discloses a brace (8, 9) transversely extending between lateral sides of at least two of the microstructure stud capacitors (7) for supporting the at least two stud capacitors (see figs. 3-4).

Furthermore, the claim does not define the material of the brace as a single layer.

Therefore, Hieke meets and anticipated the claim language.

- Applicant argues that Hirose fails to teach or suggest a "plurality of braces transversely extending between lateral sides of a microstructure" since Hirose's element 1 is bonded on the top surfaces of elements 3.

Applicant's argument is not persuasive because Hieke clearly discloses a plurality of braces (1) transversely extending between lateral sides of microstructure (3)

Art Unit: 2814

(see fig. 1A). Furthermore, the claim does not recite that the brace is bonded to the lateral sides of the microstructure. Therefore, Hieke meets and anticipated the claim language.

- Applicant argues that Shareef fails to teach or suggest “wherein said at least two microstructures are supported only by said at least one brace” because, the elements 30 of Shareef (conductive layers) are also supported by layers 28 (conductive layer) and layer 26 (capacitor dielectric).

Applicant’s argument is not persuasive because Shareef clearly discloses wherein said at least two microstructures (30) are supported only by said at least one brace (20) (see fig. 8a). Since layer (28) in the Shareef’s device is part of the microstructure, layer (26) is a capacitor dielectric and layer (22) has been removed (see fig. 8a) wherein layers (28) and (26) are similar to the present invention as layer (600) is part of the microstructure and layer (601) is a capacitor dielectric, respectively. Moreover, layers (28 and 26) only wrap around each of the microstructures thus layers (28 and 26) do not support the microstructures.

### ***Conclusion***

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

8. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hoai v. Pham whose telephone number is 571-272-1715. The examiner can normally be reached on M-F.

10. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael M. Fahmy can be reached on 571-272-1705. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

11. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



HOAI PHAM  
PRIMARY EXAMINER